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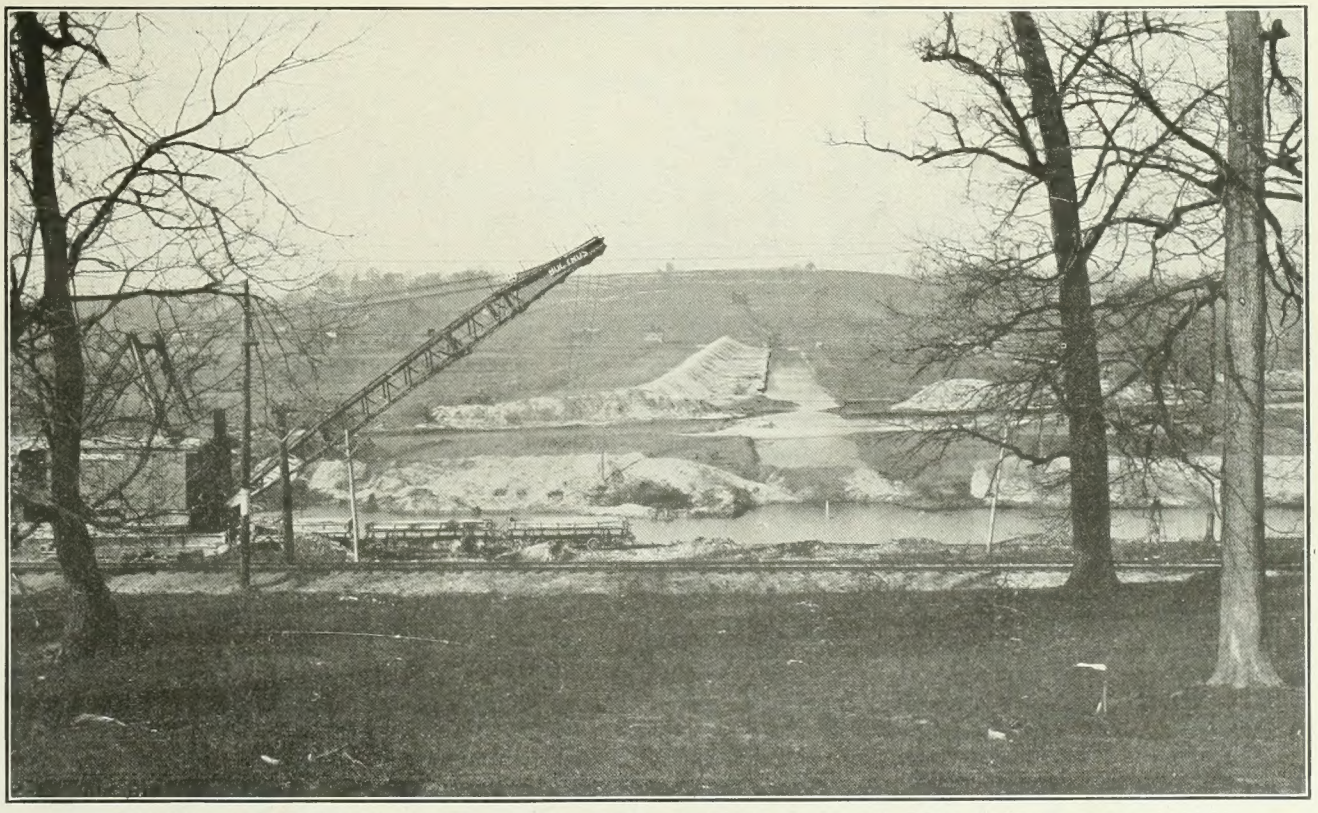

LOOKING NORTHWESTERLY ALONG THE CENTER LINE OF THE HUFFMAN DAMSITE

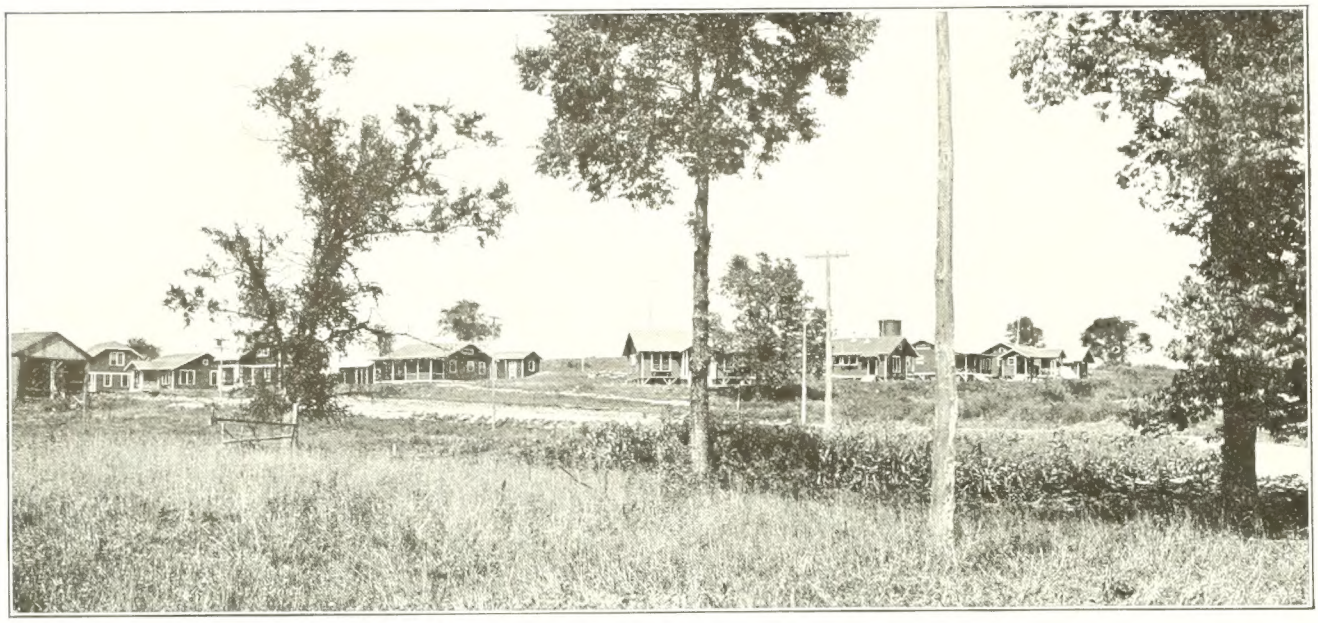

FIG. 77—THE COMPLETED CAMP AT LOCKINGTON

This is the smallest camp at any damsite. The near vicinity of the village of Lockington made fewer houses necessary. It saved also the building of a school house, and of a special structure for a first aid hospital.

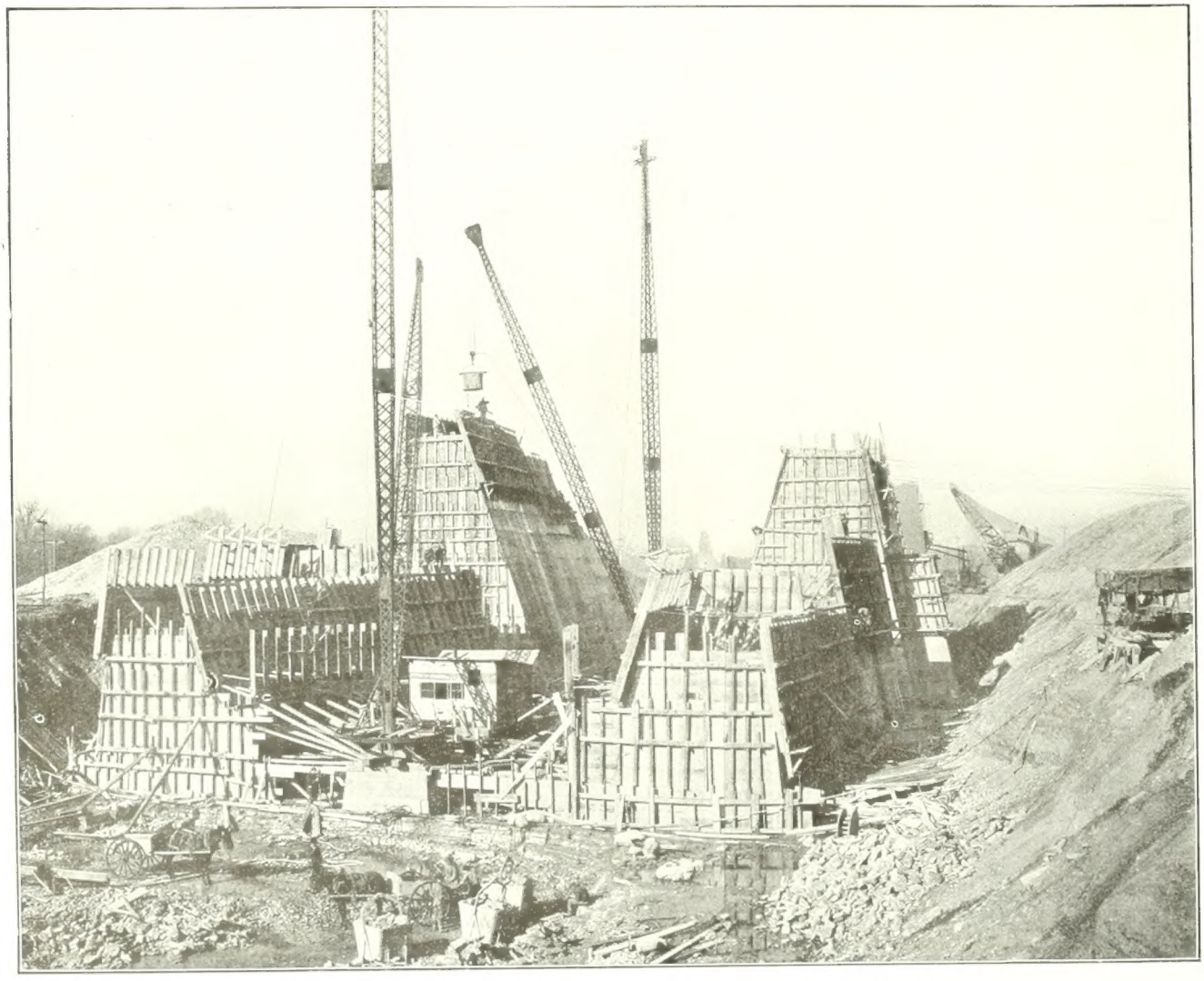

FIG. 78—THE CONCRETE STRUCTURE AT LOCKINGTON

BOARD OF DIRECTORS
Edward A. Deeds, President
Henry M. Allen
Gordon S. Rentschler
Ezra M. Kuhns, Secretary

Arthur E. Morgan, Chief Engineer
Chas. H. Paul, Asst. Chief Engineer
C. H. Locher, Construction Manager
Oren Britt Brown, Attorney

THE

MIAMI CONSERVANCY BULLETIN

PUBLISHED BY THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

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The Camp Becomes a Self-Governing Body. Commission Form of Government Adopted.

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Subscription to the Bulletin is 75 cents per year. At news stands 10 cents per copy. Business letters should be sent to L. F. Wilcock, Assistant Engineer, Miami Conservancy District, Dayton, Ohio. Matter for publication should be sent to G. L. Teeple, Miami Conservancy District, Dayton, Ohio.

The Return of the Men from War Service

In the course of the war the District supplied for the service of the United States something over a hundred men from those in its employ. They went into nearly all the branches of the army service; many went also into government engineering and construction work. With the end of the war, the tide is turning; the men are coming back to us. A large number of these men, perhaps most of them, the District will be able to take once more into its employment. Toward many of them it feels itself under obligation, but it cannot, of course, undertake to furnish places again for all. The exigencies of carrying on the work made it necessary that the places of those who left be filled, and even with the expected expansion in the spring, it is scarcely likely that places can be found for all. Where places cannot be found for the men inside the Conservancy organization, the attempt will be made to secure employment for them elsewhere.

The United States Supreme Court Upholds the Conservancy Act

A recent opinion rendered by the U. S. Supreme Court confirms the constitutionality of the Conservancy Act. The action on which the court passed judgment, was brought by W. P. Orr of Piqua against the Miami Conservancy District directors, and was instituted in the form of an injunction to restrain the directors from collecting assessments against the property of the plaintiff and other persons in Piqua, who had been declared to be benefited by the construction of the flood control works. The case had formerly been tried before the U. S. District Court of Southern Ohio, which decided the case against the plaintiff, who then carried it to the Supreme Court of the United States.

The opinion rendered, while specifically affirming the legality of taxation and expenditures for Conservancy purposes within the Miami River Valley District, also applies to similar taxation and expenditures made under the act in other districts.

This constitutes the final step in litigation which has extended over a period of about five years, and which has resulted almost uniformly in favor of the Conservancy District.

The Report of the Board of Directors

The first report of progress submitted by the Board of Directors of the District, was filed Tuesday, December 10, in the Common Pleas Court of Montgomery County, in printed form.

The report reviews the activities of the District since June 28, 1915, the date of its organization, and takes up in succession matters pertaining to official plan, appraisal roll, sale of bonds, purchase of farm lands, taxation, and the legal status of the District.

Two exhibits, or supplementary reports, accompany the report of the directors. The first is by Gilman & Ellis, of Chicago, certified public accountants, who were appointed by the Court to audit the books and financial transactions of the District. The second is by Arthur E. Morgan, Chief Engineer, reviewing the progress made in the construction of the

flood control works and giving detailed information as to the work done at each of the construction sites. It includes also lists of the pricipal items of equipment in use and the quantities of work performed.

In closing, the Board of Directors express the hope, in view of the cessation of the war, that it will be possible to complete the work according to schedule and within the estimated cost.

The Last Technical Report Elicits Favorable Comment

On account of their value to the engineering profession and the public, the technical reports on the investigations, made under the direction of the Chief Engineer of the District, regarding floods and flood prevention, have been sent to leading engineers throughout the country. The responses have been often highly appreciative. Concerning the report noted in our last issue, the "Calculation of Flow in Open Channels" by Ivan E. Houk, it may be of interest to quote one or two of the letters received. Such communications from leading engineers are not only gratifying to the engineering staff of the District, but have their value in confirming the validity of the deductions derived from the data. They should be helpful to the public also, as giving further assurance that the foundation on which the flood control work has been based is a sound one.

"It is an extremely valuable contribution to the engineering literature of this subject, and the author, his assistants and yourself (Mr. Morgan) are to be congratulated for the thoroughness with which the subject has been treated. The fact that you have confirmed the accuracy of the Kutter formula, and have, thereby, established its reliability more firmly in engineering literature, is an outcome of your investigation that practically all engineers will be gratified to learn."

Another engineer says: "The extreme care your staff has taken to secure data as to flood conditions and to collect, sift out and compile reliable data from other sources, both national and international, makes the work classic. The profession owes to you and your staff a deep debt of gratitude for your labors and for giving it the benefit thereof."

Camp Community Associations

We publish on another page an account of the organization of the Taylorsville Community Association, which is worth careful reading. Ordinarily a construction camp, outside of its connection with the contractor who employs the men, has no organized community feeling, much less a community government. The men segregate in knots or groups, when not at work, in a manner which is more or less haphazard. There is no concerted effort for a common object. Lacking a common center, the camp can scarcely be called a community. Whatever government or discipline exists is imposed from the outside by the contractor or men whom he puts in charge. There is practically no trace of that which constitutes democracy—self-government. Under such conditions, men do not live in a democracy but in a little autocracy, presided over by the employer, or by his representative.

The Taylorsville Community Association is a step in advance. The work lasting several years, the camp will have time to become a true self-governing community, and the association just formed marks the determination to fulfill the possibility. The commission form of government which was adopted is now familiar by reason of the marked success it has had in various cities of the country, notably in Dayton. The central authority is vested in five elected commissioners. Each commissioner heads a committee placed in charge of one of the various camp interests and activities; such as Community Service, Social Service, Education, Record, and Finance, and Community Safety; the broad objects of all being self-government, self-help, and self-improvement. The plan described is not confined to Taylorsville, but is being adopted at the other Conservancy Camps.

The organization has decided advantages over that of an ordinary village in that it furnishes one clearing-house and center of energy for all the camp influences and activities. In many small communities, these energies are largely dissipated in turning the machinery of a multitude of organizations and duplicated plants. The Taylorsville community has no plant or organization which is not available to the entire body of people. The school can perfectly well serve at night for dances or lectures, and on Sundays for religious gatherings. In case of sickness or trouble, one public welfare committee can mobilize the neighborliness of the entire camp better than could half a dozen competing agencies. It is for these reasons that the new movement has unusual significance. It is the aim of the people at the Taylorsville Camp to get everybody pulling together—old and young, men and women, men with families and those without—sharing the common burdens and responsibilities, and helping to make the camp reflect the best purposes of its members. The Bulletin wishes the movement success and will be glad to co-operate in making it so.

River and Weather Reports

With this issue the Belletin begins a series of monthly reports from the Conservancy Flood Warning Service, which will run through the winter and spring and perhaps longer. The season is beginning when the attention of the people of the valley and to some degree their apprehension turns toward the river. The reports ought therefore to prove timely. In the same connection the article describing the Conservancy Flood Warning Service, on page 93, will also be of interest, and will tend to give reassurance as to the thorough-going and careful watch which is kept by the District authorities on the valley waters.

The New Year

The Bulletin wishes its readers a Happy New Year. It feels that in the face of all the difficulties which the work of the District was facing a year ago, the record of the past twelve months has been distinctly encouraging. A great deal has already been done. The winter so far has been exceedingly favorable, so that work, for the most part, has gone on with little interruption from storm or cold weather, and almost everywhere is still in progress. The legal embarrassments, which from time to time have threatened, seem to have reached an end with the decision of the United States Supreme Court referred to in another editorial. With the war behind us and peace and stable conditions ahead, the end of the year which is coming should see the work of flood prevention far on its way.

The Proportioning of Conservancy Concrete

Sand and Gravel from Each Damsite Graded and Tested Before Using. Maximum Economy Secured by Careful Proportioning.

The quantity of concrete to be placed in the flood prevention works of the District is large and its expense will be correspondingly high, probably about two million dollars. With so heavy an expenditure, questions of unit cost become important; as even a small saving per cubic yard will amount to a large sum. At the same time, the quality of the work must be as absolutely safeguarded as engineering science can make it. It must be the first consideration in every instance. The engineering question then becomes,—how to make a dollar go farthest in securing this absolute requisite of safety.

Concrete is best described as artificial stone. It consists of sand and pieces of broken stone, or gravel, the whole cemented into a mass by commercial cement. The resulting product, of course, can be no stronger than the materials of which it is made, and if either of these is faulty, the concrete is weakened correspondingly. Methods of mixing, placing, and "curing" the concrete, and the amount of water introduced into the mix, are also of vital importance, but this article will deal only with the very important, but often neglected, matter of the selection and proportioning of the sand, gravel and cement.

The cohesion of the particles of cement among themselves being more powerful than their adhesion to the surfaces of the sand and stone, it follows that the greater the proportion of cement, the stronger will be the concrete. But since the cement is by far the most expensive of the three materials used, the cost of the concrete will be increased correspondingly For economy, as little cement must be used as will give the strength required. Requirements vary. Concrete in bridges or arches is subjected to greater strains than that in foundations or heavy retaining walls, and obviously, should be of greater strength. It is the business of the engineer to adapt the proportion of cement to the loads to be carried. To use 15 per cent of cement in a foundation concrete where 10 per cent will do as well is throwing away money.

Of the three materials, the cement is the one which can be most certainly depended upon. Its manufacture has been reduced nearly to an exact science. All the standard brands are tested at the mills, both by the makers and by independent experts who make the testing of engineering materials their business, and who are paid by those who desire to purchase guaranteed products. No important job now accepts cement which has not passed both such tests, so that the quality of cement can usually be relied upon with great assurance.

The same is by no means true of either sand, stone or gravel. Given any standard cement, mixed in suitable proportion with these coarser materials,

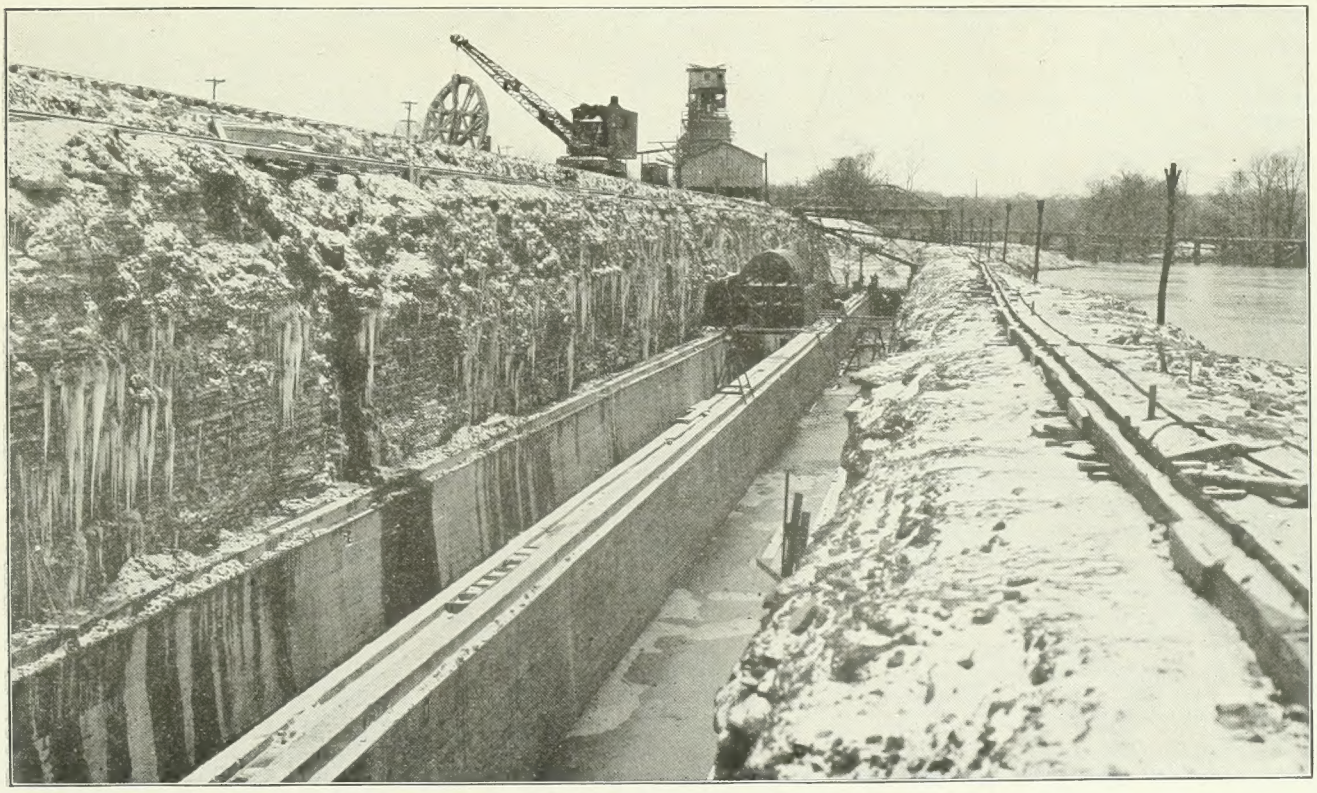


FIG. 79—THE CONDUITS AT ENGLEWOOD, DECEMBER 26, 1918.

The walls and floor of the lower half of the conduit structure appear practically completed. The section of arch form in the near distance is for the upper half. A frame for another section appears in the air at the left, suspended from the boom of the locomotive crane, and about to be swung and lowered into place.

and the mixture properly placed and cured, the quality of the resulting concrete will depend upon the character of the sand and gravel; and since the cost of transportation of sand and gravel for any distance is expensive, it always pays, in an undertaking of great magnitude, to explore the region nearby, to see if suitable deposits of such materials are available.

Such explorations, very carefully made, were carried out in the vicinity of each of the five dams of the District. They were made mainly in two ways; either by digging "test pits" by hand, with pick and shovel, or by the use of a so-called "sand pump." For exploration below ground water level, the latter method is the quicker and cheaper, and since the investigation was extensive, it was frequently employed. The sand pump used was a suction pump of the simplest form, the pump barrel being of 6″ wrought iron pipe 8 feet in length. The pit was first sunk with pick and shovel to the ground water level. An 8″ iron pipe was then set upright in the bottom of the hole. The barrel of the sand pump was then slid down inside the 8″ pipe into the sand and gravel at the bottom, and the pump plunger drawn up by short jerks by means of a portable gas engine, thus sucking the sand and gravel up the pump barrel. The 8″ pipe, at the same time, would sink of its own weight into the hole left by the sucked-up sand. When the barrel of the sand pump was full, it was drawn up, and the contents emptied out. By adding short lengths to the outer pipe, test holes were sunk by this process as deep as 20 feet.

Samples were thus taken at a number of points in the vicinity of each dam, the points being carefully located by survey. The samples were placed in 100-pound sacks, marked to indicate the hole from which they came, and sent to the laboratory for testing.

The tests of the samples covered the following points: density, gradation in size of grains and pebbles, percentage of "voids" or spaces between the grains and pebbles, percentage of silt contained, and character of material. The density of a sample gives some indication of its strength, denser grains and pebbles being usually stronger. Silt is the very fine material which, when shaken up in water, remains suspended and makes the water turbid or muddy. It may contain considerable organic matter, in which case it injures the sand by introducing a weak ingredient. The percentage of voids and the grading in size of grains and pebbles are interconnected, and affect the amount of cement which must be used to make a concrete of desired strength. They thus affect the cost.

The effect of the "voids" on the cost of the concrete is easily seen. Suppose a gravel is made up of rounded stones of uniform size, say 1″ in diameter. There will evidently be large void spaces between the stones. Tests show that in such gravel the voids occupy about 55 per cent, or more than half of the total volume. If concrete were made with gravel of only that size, it would require the mix to be more than half cement, and would thus be extremely expensive. If the spaces between the 1″ stones are filled with smaller pebbles and the spaces between these with sand, leaving only the spaces between the sand grains to be filled with cement, a concrete may be obtained which will be as strong as the first, but which, since it contains much less cement, will be correspondingly cheaper. What is known as the "proportioning of concrete" is the using of graded sand and gravel with cement in such proportions as will produce the desired strength at the least cost. The tests for percentage of voids and grading of grains and pebbles for sand and gravel are invaluable as a first aid in securing correct proportions.

In getting the correct proportions, the sand, gravel and cement are taken separately. The gravel as obtained from the bank, "run of bank gravel" as it is called, may consist of all sizes from extremely fine sand to stones of many pounds in weight. For most concrete, the largest size stone permitted is about 4″ in diameter; in many cases, the maximum is no larger than 1½″ or 2″. From the maximum size down to ¼″, the material is known as "coarse aggregate" and from ¼″ down to the finest grains, it is known as "fine aggregate," or sand. In investigating any gravel, the amounts of the various sizes always should be determined. This is done by passing the material through one screen after another, proceeding from coarse to fine. For the coarse aggregate, the wires in the screens may be successively 2½″, 2″, 1½″, 1″, ¾″, ½″ and ¼″ apart, and for the sand, 4, 8, 14, 48, 100 and 200 meshes to the linear inch. Just what proportions of the various sizes must be re-combined to produce the cheapest concrete of the desired strength is a matter of somewhat elaborate theory, combined with sound judgment based on experience under working conditions. It cannot be enlarged upon here. It ought to be added that the strength demanded of concrete, as of other building materials, is always far in excess of any strain expected to come upon it. A common value is to make it five times as great.

Since the fine grains of sand will fill the spaces between the coarser grains, leaving the cement only to fill the spaces between these finer grains, it is evident that the amount of cement required to produce a concrete of given strength will depend upon the graduations in the sand grains as well as upon the ratio of sand to gravel. It is for this reason that mechanical analyses of sand to determine the proportions of the various size grains contained in it are necessary. The mortar; that is, the mixture of cement and sand, is indeed, the important factor in the making of concrete. If the mortar is right, the concrete will be good, though the coarse aggregate vary within wide limits; if the mortar is not right, the concrete will be correspondingly poor. This is why, in investigating materials for the Conservancy dams, the tests of the sands, and of the strength of the concrete mortars which were made from them, were carried through with special care.

The conclusive tests, those to determine the actual breaking or crushing strength of the mortars from Conservancy sands, were made by standard methods. The mortars were made into "briquettes" and 2-inch cubes. A "briquette" is a flat block, shaped like a dumbell, 1″ wide at its narrowest part. It is so shaped in order that it may be clasped at the ends by the fingers of a testing machine (a standard Fairbanks shot machine), and pulled in two, the force required being measured in pounds by a pair of scales, thus giving directly the breaking strength of the material per square inch. The 2″ cubes were crushed in a compression testing machine. Several specimens were broken representing each sample of

sand, to insure against misleading results. The figures obtained were compared with those of similar tests made from the same cement mixed with Ottawa sand, a very uniform sand found at Ottawa, Illinois, universally used as a standard in engineering tests. The results are shown in Table 1 below, an average sand being shown from each of the five damsites of the District. It will be seen that typical sands from each of the damsites gave a stronger mortar than the standard sand. The table shows that the strengths of all of the Conservancy cement mortars were up to, or above first-class standards of engineering practice.

To make assurance still more sure, tests were made by crushing cylinders of concrete, 6 inches in diameter and 6 inches high, made from the sands and gravels from the various damsites. The results, shown in Table 2, were also up to the best engineering standards.

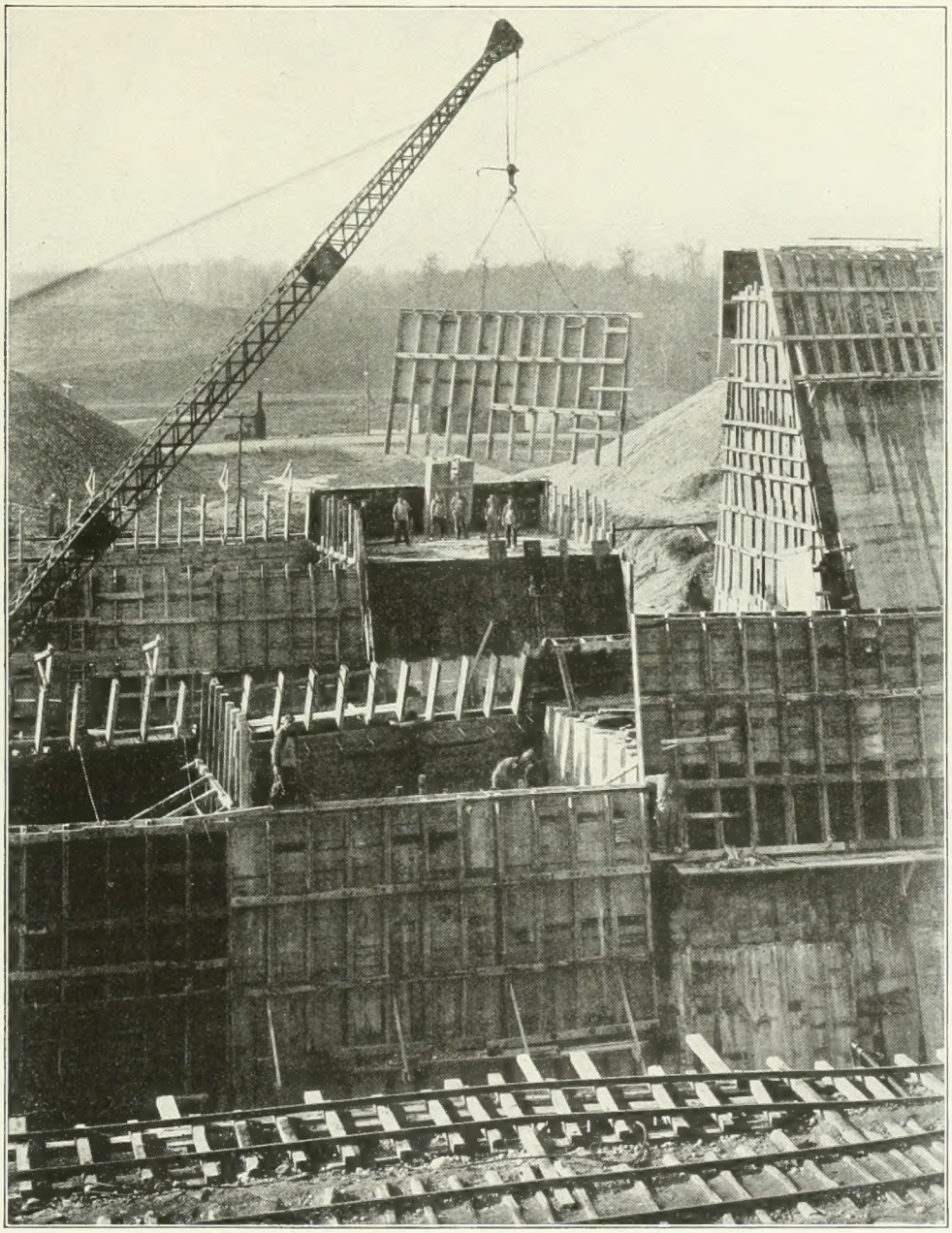


FIG. 80—REMOVING A SECTION FROM THE CONCRETE FORMS AT LOCKINGTON, DECEMBER 16, 1918.

The section is seen hanging from the end of the 105-foot derrick boom. It has just been removed from the finished face of the retaining wall a little below it. The men below it are standing on the unfinished top of the wall The sections are 16x27 feet in size, built of 2x12-inch studding faced with 2x10-inch planks and braced by 4x6-inch "wales" bolted to the back as shown. The lower part of the form, when in position, is bolted to cast-iron nuts imbedded in the concrete already poured, the upper part projecting to receive the fresh concrete, as may be seen immediately behind the men on top of the wall. What look like tall boxes back of the two center men are forms for the "keyways" which will lock this section of the wall into the embankment of the finished dam. The top of the unfinished wall at the right still lacks over 20 feet of reaching its full height.

In applying the results of these investigations to the securing of the best concrete in the dams, such modifications are made as are suggested by the long practical experience of the engineers in charge. The various operations of washing, screening, storing, measuring and mixing of the gravel, sand and cement are under continual watchful supervision. The coarse aggregate, divided and stored in two portions, is measured into each batch of concrete through specially designed boxes, one for the coarser portion, larger than 1 inch, the other for the finer, the 1 inch to ¼ inch. The sand is measured in a similar box, and all the boxes admit slight variations in capacity to suit changes in the materials as they come from different portions of the gravel pits. The consistency of the fresh concrete is also carefully guarded, this being as necessary to secure good results as is the proper proportioning of the ingredients.

The concrete is mixed in batches, each batch amounting to slightly more than one cubic yard of concrete in place. For convenience in handling, the sand and gravel boxes are adjusted so that an integral number of bags of cement may be used, 5 or 6 or 7 bags to the batch, depend-

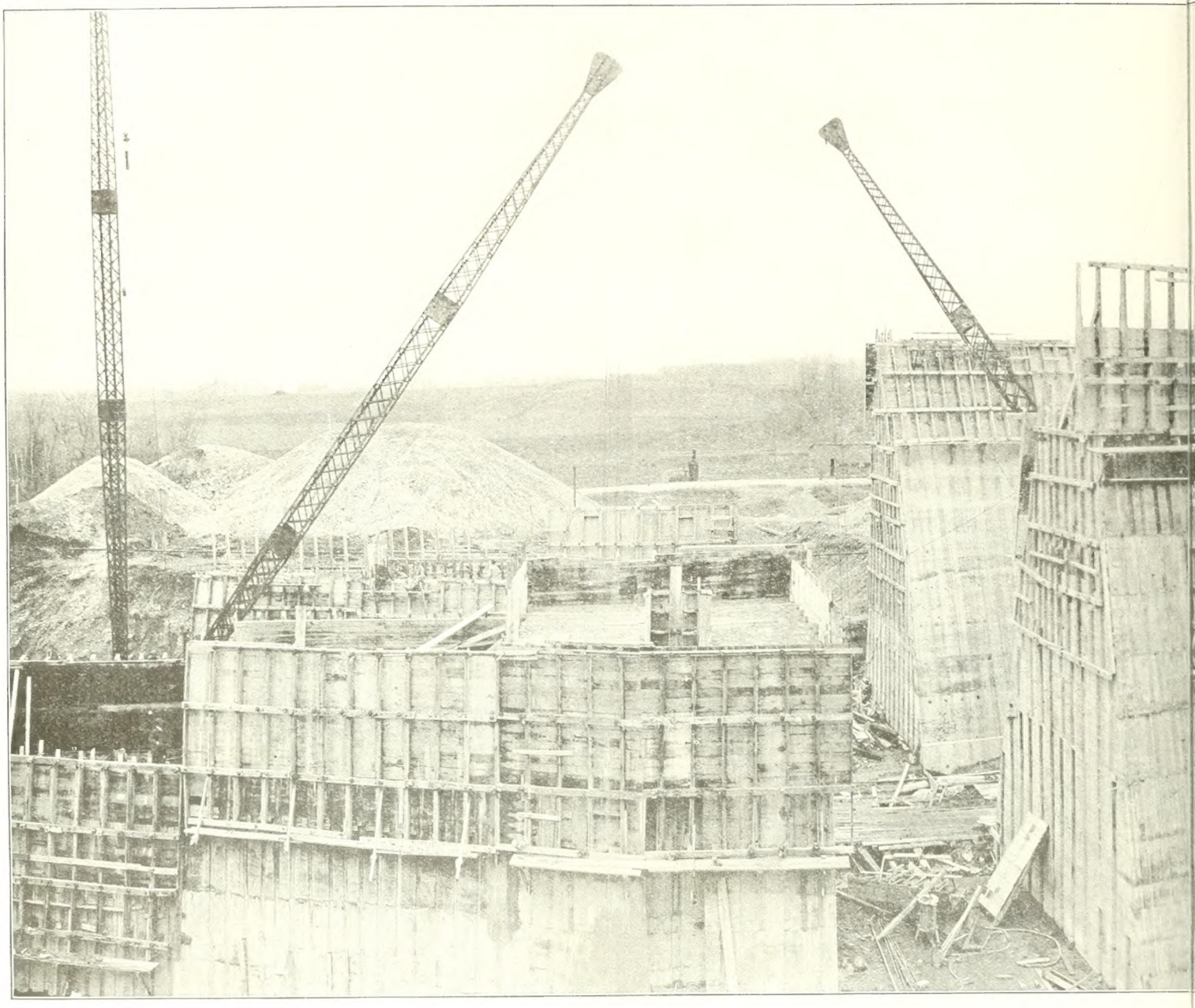


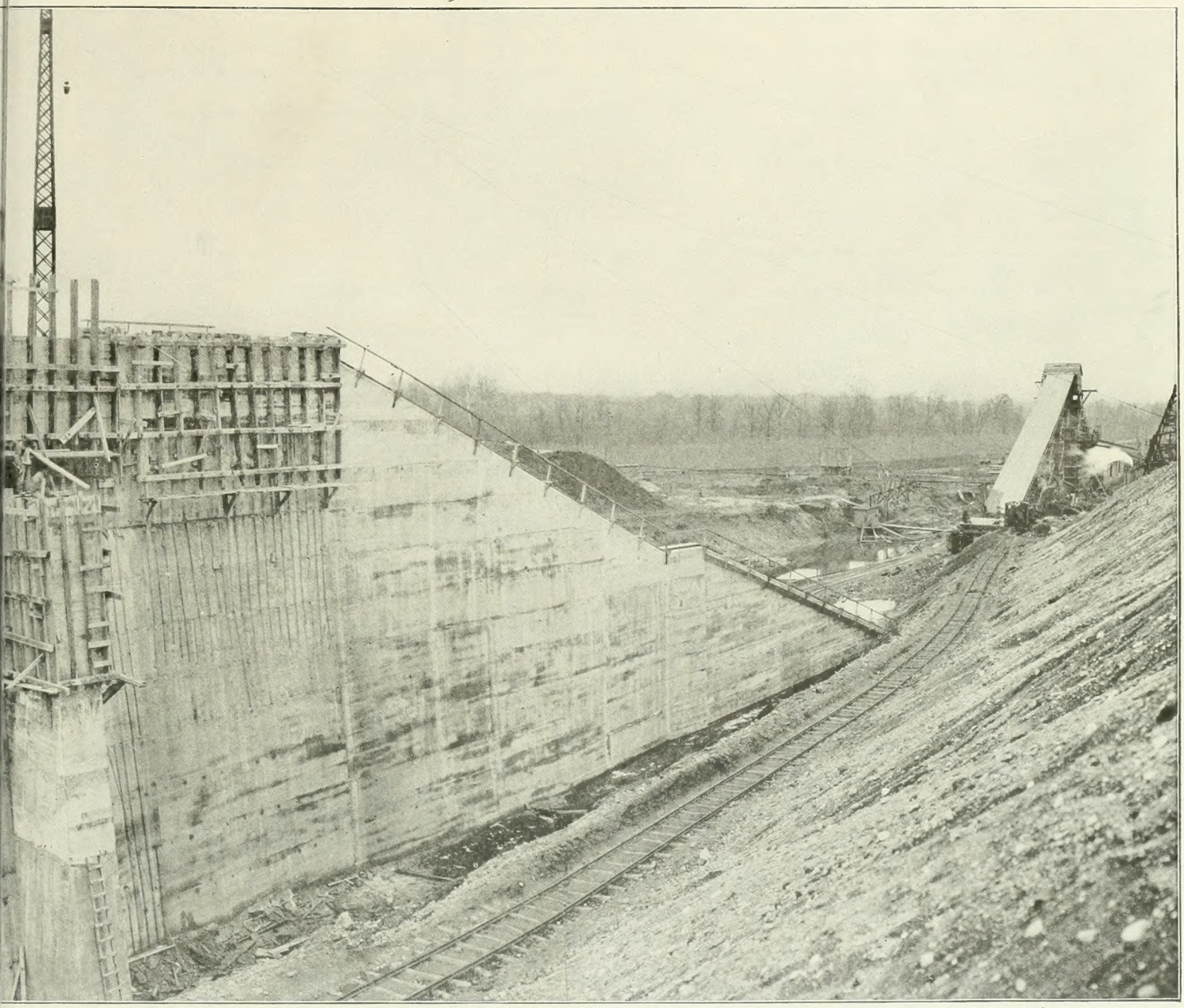
FIG. 81—THE CONCRETE STRUCTURE AT LO

ing upon the strength of concrete required, and also upon the character of the particular sand being used at the time. The proportioning of sand to cement is carefully adjusted to give the requisite strength to the mortar... The final adjustment of the amount of coarse aggregate is determined prac-

TESTS OF MIAMI CONSERVANCY DISTRICT SAND MORTARS, ONE PART CEMENT TO THREE OF SAND, MADE INTO 2-INCH CUBES

Location	Breaking Strength Under Compression, lbs. per sq. in.									
	7 days	%*	28 days	%*	3 months	%*	6 months	%*	1 year	%*
Germantown Dam	1380	129	2480	138	2790	124	2720	122	2910	125
Englewood Dam	2220	148	3620	132	4090	133	.....	.....	.....	.....
Lockington Dam	1900	140	2940	126	4160	130	3250	147	.....	.....
Taylorsville Dam	1890	144	2530	124	3360	125	3130	116	3480	125..
Huffman Dam	2010	140	3370	163	4210	138	4220	.....	.....	.....

* The % columns above give the relative strength of the Conservancy Mortar expressed as a per cent of the strength of Ottawa standard sand mortar containing the same proportions of cement.



INGTON, DECEMBER 23, 1918. SEE PAGE 92.

tically by the behavior of the fresh concrete in the forms. With too much coarse aggregate, the spreading and spading in the forms is difficult, and therefore not economical. With too little coarse aggregate, the spading and spreading are easy, but the concrete is unnecessarily rich in cement, and therefore unduly expensive.

At the three dams, Lockington, Englewood and Germantown, where concrete is now being placed, the sands and gravels differ to a considerable degree. At Germantown, the sand is nearly ideal, being well graded in size, with a correspondingly small percentage of voids. At Lockington, there is a deficiency of fine sand, and an excess of the medium, the so-called "grape seed" size. This increases the proportion of voids, and the deficiency must be supplied by cement; the Lockington mix, compared with that at Germantown for the same strength, being somewhat richer in cement. Methods are being worked out at Lockington to get rid of the excess of the "grape seed" size, giving a better grading and thus a saving in cement amounting to as much as $.75 per cubic yard, or, at the rate at which concrete is being placed, about $200 per day. At Englewood there is great variation in the pit gravel as it is taken out from day to day and even from hour to hour, so that the material receives unusually careful watching. Mechanical analyses of the sand are made daily, and compared with those of the sands which had proved of standard quality under breaking tests. Regular determinations of silt are also made there.

The preliminary tests and investigations of the Conservancy sand and gravel, referred to above, were carried out under the supervision of H. S. R. McCurdy, now Division Engineer in charge at the Englewood Dam. General supervision of all the concrete work of the District is exercised by Mr.

TESTS OF MIAMI CONSERVANCY DISTRICT GRAVEL CONCRETES
MADE INTO 6-INCH x 6-INCH CYLINDERS

Location	Proportions by volume of cement, sand and gravel	Breaking Strength under Compression, lbs. per sq. in.	
		At End of 28 Days	At End of Three Months
Germantown Dam	1 : 1.8 : 4.2	2630	2880
Englewood Dam	1 : 1.9 : 3.9	2720	3310
Lockington Dam	1 : 1.8 : 4.1	1900	2150
Taylorsville Dam	1 : 1.8 : 4.0	2330	2640
Huffman Dam	1 : 1.9 : 3.9	2460	2960

Chas. H. Paul, Assistant Chief Engineer, whose long experience in charge of important concrete construction, notably at the Arrowrock Dam, gives assurance that the theoretical considerations, outlined in the foregoing, will be carried out in accordance with the best conservative practice.

Portfolio of Conservancy Pictures

The double page picture of the work at Germantown, published in the December Bulletin, has attracted so much favorable comment that it has been determined to put copies of the picture, printed on special paper, on sale. There will be a number of similar, double-page pictures in the Bulletin from time to time, and inasmuch as it is thought many would be glad to have a complete collection, it has been decided to print them all separately, as they come out, on paper uniform in size and quality with the first. Arrangements are also under way to have a cover or portfolio made, of attractive design and inexpensive in price, in which the pictures can all be gathered together and preserved. Until further notice, orders may be placed with the Division Engineers in charge of the various features of the work, or directly with the Bulletin office at Headquarters. The price of the pictures will be 10 cents each. The price of the cover will be announced later.

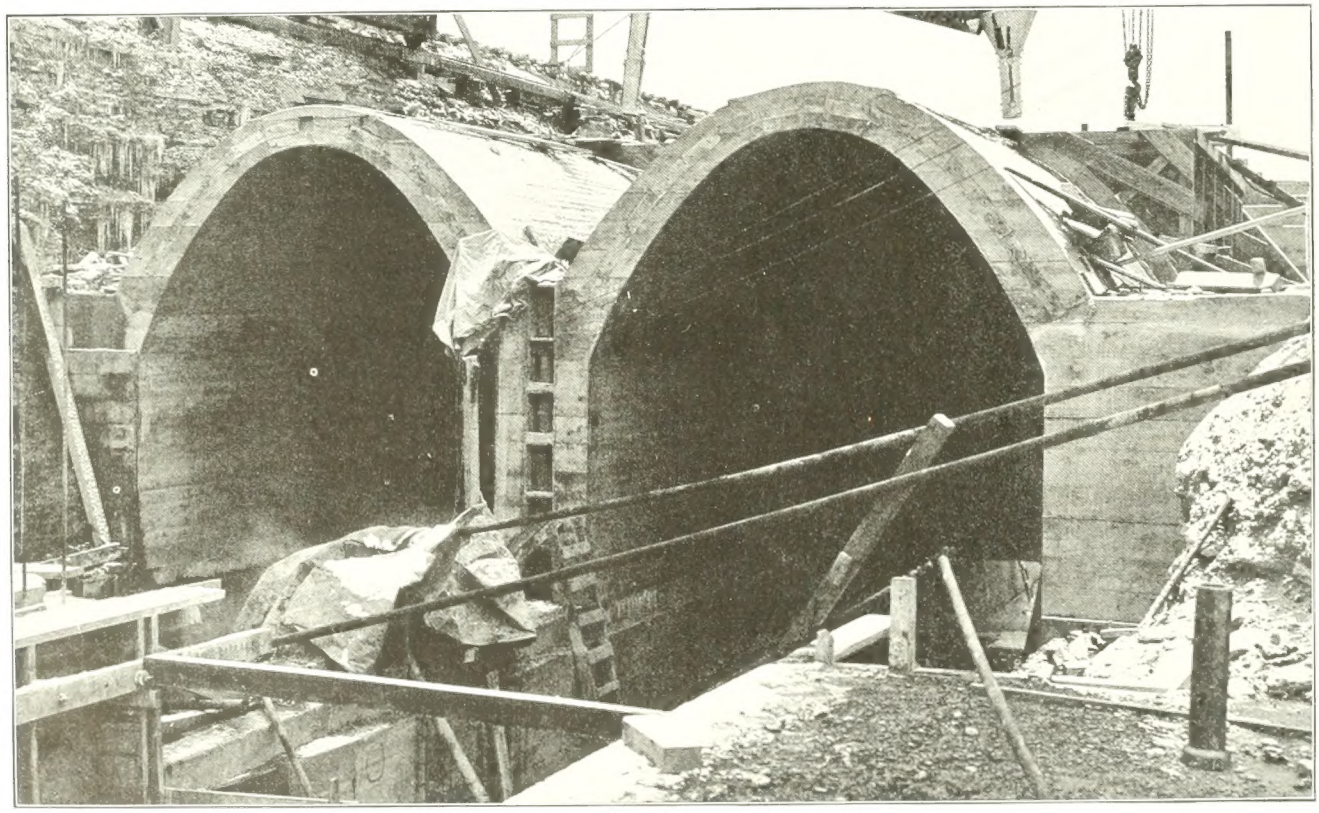


FIG. 82—FINISHED SECTION OF CONDUITS, ENGLEWOOD, DECEMBER 26, 1918.

The Stillwater River, which is a little to the right out of the picture, will, after the Englewood dam is finished, flow through the two arched openings, which at the center will be buried over a hundred feet deep in the earth of the dam. The wing of concrete at the right projects and locks into the rock wall of the excavation. This prevents the end thrust of the water behind the dam, during floods, from displacing the conduit structure. There are a number of such projecting collars along the conduit.

December Progress on the Work

GERMANTOWN

Concrete has been placed at a satisfactory rate during the month. Temporary floor of conduit will be finished to center collar wall before the month is out, 237 feet having been completed to date. The weirs, 90 feet of partition wall, 180 feet of the lower half of the conduits, and 61 feet of the north wall of the outlet works have likewise been finished. A 95-foot section of the north wall of the outlet is 70 per cent complete. The total amount of concrete placed up to December 15th is 5100 cubic yards.

Excavation for the conduits is progressing satisfactorily. It has now been completed for somewhat more than half of the conduits proper.

The large dragline engaged in this work was temporarily moved in order to excavate a trench to remove a layer of gravel which gave trouble by permitting seepage from the river. The gravel was removed, the trench refilled, and approximately 75 per cent of the seepage was eliminated.

The erection of the arch forms at the lower end of the conduits has been completed. These arches will be poured within a few days.

Equipment is being installed at the mixing plant to heat the sand and gravel bins by means of steam pipes, so that concreting may be carried on into the cold weather as far as possible.

The bunk houses are being lined with wall board to insure against cold weather.

Arthur L. Pauls, Division Engineer.

December 15, 1918.

ENGLEWOOD

The concrete floor of the outlet conduits has been completed for its entire length, the apron at the inlet and a portion of the apron at the outlet remaining to be done. The lower sidewalls are finished except five 30-foot sections at north end. The westerly sidewall of the outlet and the forms for the easterly sidewall, next the river, have been started. The total quantity of concrete poured to date is 8,300 cubic yards.

The dragline which made the conduit excavation has worked down the river, stripping from the bottom all objectionable material, and doing most of the work in the channel crossing the damsite which was necessary in preparing for the dam embankment. The excavated material has been piled in a windrow along the east bank. The dragline will now proceed along this bank and load the excavated material into cars. The rock portion, suitable for the outside of a dam, will be placed in the down-stream toe. The earth portion will be stored just outside the toe to be later spread upon the graded slopes and sown to grass.

The cross dam along the east river bank is proceeding rapidly. This is essentially an earth retaining wall, extending across the damsite, and constructed in all respects as a part of the permanent embankment, for the purpose of enabling the hydraulic fill east of the river to proceed without waiting for the completion of the outlet conduits and the consequent diversion of the streamflow. Material for this work is being excavated by a large electric dragline from a pit about a thousand feet upstream from the dam, and just east of the river. Loaded into dump cars, it is then transported to the dam, where it is placed in final position in the cross dam by means of another electric dragline.

Work is in progress on the grading and the placing of concrete foundations for the pumping plants, to be used in the building of the dam embankment by hydraulic fill.

The labor situation is responding to the new conditions brought about by the cessation of the war, and an embarrassing factor in the prosecution of the work bids fair thus to rectify itself.

H. S. R. McCurdy, Division Engineer.

December 15, 1918.

LOCKINGTON

Work on retaining walls and floor of concrete structure has progressed steadily, total yardage poured to date being 14,500. The walls have reached a maximum height of 60 feet.

About 1000 cubic yards of rock have been excavated from the hydraulic jump pool section south of the unfinished concrete work. Part of this material has been used as "plums" in the concrete, and part stored for later use as "riprap."

The large dragline (2½-yard bucket) has begun excavation for the outlet channel, south of the dam, into Loramie Creek. Immediately south of the site of the concrete structure, the material is being left in place to help form a natural cofferdam around the work during construction. About 80,000 cubic yards have been excavated from the new channel.

The small dragline (1-yard bucket) is loading gravel from storage pile into cars which take it to the gravel washing plant.

Over one mile of grading on Road No. 9 has been completed. Clearing and grubbing are now in progress along the south part of the road right-of-way.

Price Bros. contract for repairs to Port Jefferson dam is nearly completed. Materials for planking the dam are now on the ground. This work will be done by the District.

Channel improvement of the Miami & Erie canal, from the feeder at Lockington north to borrow pits at the dam, will be done during the winter.

Work on the transmission line from Dayton is progressing favorably and will be completed soon after the beginning of the new year.

About 20 cases of influenza developed at the camp. One death resulted, that of Mrs. John W. Bolton, the wife of Superintendent Bolton. At present there are no cases of the disease in camp.

Barton M. Jones, Division Engineer.

December 16, 1918.

TAYLORSVILLE

The gravel washing plant is now practically complete, except for dumping hopper and installation of machinery. The slight change in location of the concrete outlet work, made necessary by seepage of river water through a bed of gravel discovered in the course of excavation, has now been approved by the chief engineer, and the new cross sections have been taken and platted. The north end is not moved, but the south end is swung 50 feet east. Excavation for the outlet works is being done both by the Lidgerwood dragline and the sluicing plant for the hydraulic fill. To December 1, 73,000 cubic yards had been taken out, and the progress since has been very satisfactory. The material excavated by the dragline is being dumped upon the upstream side of the embankment that was built from material taken from the cut-off trench, whence it will be sluiced to the upper toe of the dam by the method of semi-hydraulic fill. About 30,000 cubic yards will be thus placed and later covered with a blanket of Cincinnatian rock.

Three additional double houses have been completed at the camp. Lumber for the camp coal houses has arrived, and a number of these are under construction.

There is now one case of pneumonia in camp; otherwise, the health of the community is excellent.

O. N. Floyd, Division Engineer.

December 16, 1918.

HUFFMAN

Excavation for the outlet works has been continued during the past month. A total of about 20,000 cubic yards of rock and clay has been removed and placed in the fill on the relocation of the Big Four and Erie railways. Holes for blasting out the rock in this excavation are drilled by an ordinary well drill, a wagon drill and by tripod air drills. For trimming the slopes of the excavation, Jap drills are used

The steam dragline has completed the excavation of the cut-off trench across the valley to the Erie Railway, and has started back, distributing the material excavated from the trench to its proper place in the permanent embankment of the dam.

A large shed has been built adjacent to the concrete mixing plant, for storing cement to be used in the various concrete structures in the dam.

C. C. Chambers. Division Engineer.

December 20, 1918

DAYTON

The two large dragline excavators have removed to date 235,000 cubic yards of channel excavation. Including the material moved more than once, a total yardage of 354,000 has been handled by these machines.

McWilliams Northern Dredging Co. has placed 43,000 cubic yards of levee embankment in the levee enlargement along the Miami River northward from Island Park (Contract 41). Team work on the lower end of this contract is progressing slowly.

The 12-inch water main crossing the river channel opposite Linwood Avenue has been lowered to its final grade. A temporary sewer extension has been installed for a 22-inch sewer outlet at the east end of Van Cleve Park.

Little progress has been made on the Sunset Avenue dry dock on account of continued high water.

C. A. Bock, Division Engineer.

December 16, 1918.

HAMILTON

Both draglines are working in "pay dirt" now, excavating from the channel and placing material in the levees. Good progress is being made.

Two scows purchased from the A. J. Yawger Co. have been repaired and are ready to be launched.

A water tank for supplying the locomotives has been erected.

An 18-inch pipe has been laid through the Miami & Erie canal levee. This will discharge into Crawford's Run a sufficient amount of water to supply the Ohio Electric Power Station with condensing water.

Work has been begun on the relocation of Black Street. This involves taking up and relaying 12-inch and 16-inch water mains, laying new gas mains, storm water sewer, brick paving and sidewalks. The 12-inch storm sewer has been laid, and brick are being removed from the old street. F. C. Williams, Superintendent on the Buckeye Street sewer, is looking after this work.

The concrete sewer in Buckeye Street has been completed for a distance of 745 feet. The excavation is 50 per cent completed.

Three of the houses in Peck's Addition taken over by the District have been wired for electric lights.

C. H. Eiffert, Division Engineer.

December 14, 1918.

RAILROAD RELOCATION

Erie and Big Four. The Walsh Construction Company, general contractors, with subcontractors Condon & Kolterman and Condon & Ward, have completed to date 60 per cent of the excavation. One steam shovel and two grading excavators have been used. Condon & Kolterman and Condon & Ward have suspended operations for the winter on account of weather conditions.

The masonry work being done by F. H. Sprague and Frank Hill Smith, Inc., working for the District, is 80 per cent completed. The underpass at Huffman Hill, built by the Walsh Construction Company, was completed several months ago and now the Bethlehem Steel Company is erecting the steel superstructure.

Excavation for Mad River channel change just above Dayton Hydraulic Company's head gates has been started.

Grading for the Springfield Pike at Fairfield is completed and Contractor McCann has completed about 50 per cent of the gravel surfacing.

Baltimore & Ohio. General contractors, Grant Smith and H. C. Kahl, and subcontractors, Condon & Smith, Vang Construction Co. and Kahl Bros. Construction Co., have in all five steam shovels and one grading excavator in operation, and have excavated to date 45 per cent of the grading.

Work has been started on levees alongside the new B. & O. R. R. roadbed, which will connect with Taylorsville Dam. All other grading is for the formation of the railway roadbed.

Masonry subcontractors, Vang Construction Co., G. L. La Boiteaux, and Kahl Construction Co., have completed the concrete bridges at Poplar Creek, Johnson Station, Picayune Creek and the one about one mile south of Johnson Station. Work is in progress on the 8-foot culvert at Taylorsville Dam, which is 300 feet long and extends under the roadbed and the two railroad levees. The masonry work is 90 per cent completed.

Albert Larsen, Division Engineer.

December 15, 1918.

Change in Camp and School Administration

The Conservancy District owes a great deal to C. W. Porter Shirley who, for several months past, has filled two jobs, those of Camp Inspector and Employment Manager. As Camp Inspector he has been responsible for sanitary, health, social and working conditions at the camps, directing the work of the camp foremen. As employment manager he has been called upon to keep the work of the district supplied with the necessary labor. During the past months the number of men employed each week has ranged from 110 to 280.

Mr. Porter-Shirley received complaints of all sorts—from superintendents and foremen that the supply of labor was not abundant or satisfactory; from workmen he brought to the job because he introduced them to superintendents and foremen who sometimes used impolite language in insisting that said workmen do a reasonable day's work; from occupants of the cottages if the chimneys smoked; from the women about washboards because the necessary supplies did not arrive; from the ladies because the job did not furnish the proper accommodations for the Red Cross meetings; and from the Chief Engineer and the Division Engineers for all the shortcomings, whether real or imaginary, of the camp administration. Through it all, he has worked hard and patiently, gradually bringing about results which are none the less substantial because they have been secured with so little noise that they seemed to happen of themselves.

It has never been the intention to require Mr. Porter-Shirley permanently to hold down two jobs, but until now, a suitable associate has not been available. We are much gratified, therefore, at having secured the services of Sergeant Arthur A. Hauck, whom many of us knew before his enlistment because of his admirable work as a teacher at the Moraine Park School. Sergeant Hauck will take over a part of Mr. Porter-Shirley's work, especially that relating to camp affairs and schools. We wish success to both the men.

The Lockington Work

The retaining walls at Lockington (see figures 78 and 81) are now (December 15) about 60 feet above the bottom of the foundations, and still lack 22 feet of their full height (82 feet). Their total length will be about 500 feet. The concrete floor between them will be the future bed of Loramie Creek. The section (figure 81) not yet constructed is on the center line of the dam. A heavy cross wall will be built across from one retaining wall to the other, pierced by two conduits which will carry the creek water.

The Conservancy Weather and Flood Warning Service

Many New River and Weather Stations Added—Vigilant Watch Kept on Flood Conditions.

During the construction of the flood prevention works it is of vital necessity that the District be informed as much in advance as possible of even slight flood stages in the river. There is much construction equipment, such as draglines, railway tracks, locomotives, pumps and motors which must be used in or near the river bottoms, and failure to protect it from floods would mean very serious loss and delays. It also is desirable that the people of the valley should receive all possible advance notice of any floods which may occur before the flood prevention works are completed, so that they might never again be taken unawares as in 1898 or 1913.

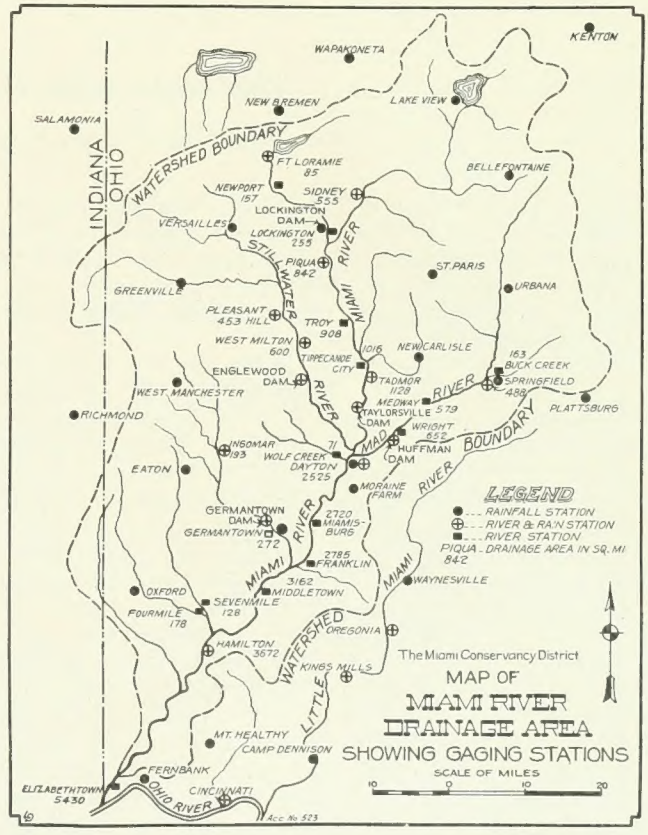
Perceiving the necessity of this, the Conservancy District in 1913 established a flood warning service, under the direction of Mr. Ivan E. Houk. There were before that time only fifteen stations in the Miami watershed where accurate measures of rain fall were made, and only three where careful measures of the river stages were taken. Steps were at once taken to increase the number of these stations, in cooperation with the United States Weather Bureau service. The Government and the District together established four new combined rainfall and river stations, the District alone established eight combined stations and thirteen new river stations, and the Weather Bureau alone established ten new rainfall stations. Thus the river stations were increased in all from three to twenty-five and the rainfall stations from fifteen to thirty-seven. These are scattered throughout the Miami Valley. Daily observations are made at all these stations, keeping thus a close and careful watch on river stages and rainfall. In ordinary weather, these observations are transmitted weekly to the District Forecaster, but in times of storm, or impending flood, they are sent in by telephone or telegraph as often as is necessary. The Forecaster may have to get up at midnight or at one or two o'clock in the morning to receive them and to arouse in turn the Conservancy engineers, and other people whose property may be threatened.

The flood warning service is as valuable in preventing unnecessary expense and alarm as it is in giving alarm when danger really impends. The memory of the 1913 flood is still fresh in people's minds. On January 31 and March 27, 1916, for instance, when the weather and river conditions seemed ominous, many would have moved out of their houses, farmers would have moved their live stock, construction companies their equipment, and merchants their stocks of goods, if they had not been assured that such steps were unnecessary. On the first of these dates two of the Conservancy engineers devoted their entire time all through the day and following night to answering telephone calls regarding river conditions. Two men of the United States weather bureau were also on duty from early morning until late at night answering such calls, totalling about 1600 in number. These inquiries came from all parts of the valley, from Piqua on the north to Hamilton on the south. At the same time an engineer experienced in flood fighting was sent to each of the cities where conditions seemed dangerous, to work with the officials in taking such steps as might be necessary.

An instance of the value of such service in property conservation is the case of the Esterline Company of Lafayette, Indiana. This company had only four or five hours' notice in 1913 of the flood, but in that time it moved from its buildings about $100,000 worth of merchandise, and all of its records, office furniture and fixtures. The belting was removed from the machinery, which was then heavily coated with grease. By these precautions, the Company saved an estimated loss of $60,000.

It is evident that such a service may well be the means of saving life as well as property, by warning people who live on low ground to move when dangerous flood impends.

The apparatus necessary to equip the flood warning bureau is simple and inexpensive, and the observers at the outlying stations are people engaged in other occupations, who give the flood warning work but a small fraction of their time. They must be intelligent and reliable, but need no special training or special skill. The instruments used are the rain gage and the river gage. The rain gage consists essentially of a brass cylinder open at the top,



MAP SHOWING RIVER AND RAIN GAGING STATIONS IN THE MIAMI RIVER DRAINAGE AREA

The round dots are rainfall stations; the square dots are river gaging stations; and the encircled crosses are stations having both river and rain gages. All these stations report regularly to the Conservancy headquarters at Dayton.

eight inches in diameter and carried on an iron tripod. It is placed in an open space well away from trees or houses. The cylinder quickly contracts into a funnel. Rain falling into the open top of the cylinder runs down the funnel into the smaller cylinder. Thus if an inch of rain falls into the open top of the instrument, it will stand ten inches high in the tube. Its depth is measured by a wooden scale. This measure, divided by ten, will give the rainfall in inches. The only use of the small tube is to magnify the scale so that the rainfall can be more accurately measured.

The river gage is even simpler. It consists of a long board painted white and divided into feet and tenths of feet by black cross-marks. This board is fastened vertically to a bridge pier or similar support, with its lower end below low water level in the river. The mark on the board at the water surface gives the stage of the river.

It will be clear from what has been said that the service of the flood warning bureau is of great value, both to the Conservancy District in its work and to the people of the valley, and that compared with the value of this service, it is very inexpensive. A considerable part of this expense, moreover, that of running the Weather Bureau stations is borne by the Federal Government.

River and Weather Conditions in November

During the month of November the river and weather conditions were comparatively favorable for construction progress. The total precipitation during the month at the eight stations maintained by the District varied from 1.73 inches at Huffman to 2.62 inches at Taylorsville. The normal precipitation for November as determined by the U. S. Weather Bureau for the Dayton station is 2.89 inches. The total number of days on which the precipitation exceeded 0.01 inch varied from 4 to 6 at the different stations.

Although small rises of from ½ to 2 feet occurred in some of the streams of the valley on the 18th and 28th, the days on which the precipitation was most intense, the stages were comparatively low during the entire month.

At the Dayton Weather Bureau station the average temperature for the month was 43.2° above normal, the lowest recorded being 23° on the 25th and the highest, 66° on the 17th. The maximum wind velocity for five minutes was 51 miles per hour, from the west on the 28th; and the average wind velocity was 10.7 miles per hour, the prevailing direction also being from the west.

Ivan E. Houk, District Forecaster.

December 15, 1918.

The Taylorsville Community Association

The Camp Becomes a Self-Governing Body. Commission Form of Government Adopted.

Taylorsville has taken the lead in self-government. The residents at Taylorsville got together and organized the Taylorsville Community Association on November 29, 1918, having held a preliminary meeting a week previous. The attached Constitution and By-laws were adopted.

The present Officers are D. D. Rogers, Chairman and Commissioner of Social Service; E. P. Come, Commissioner of Education; F. A. Meyer, Commissioner of Community Safety; B. H. Petty, Commissioner of Community Service.

Committees are appointed by the Commission to assist in carrying out the work alloted to each Commissioner. Committees report to the Commissioners and they report to the Association at the regular meetings, which are held at least once a month.

Since the organization of the Association, we have started a Sunday school, which meets every Sunday morning. On December 13th we had a picture show, which included a lecture on Ireland. December 18th, a dance was held in the School House. It was a very successful affair with a large attendance. We have arranged to have a Community Christmas tree and entertainment for the benefit of the little folks. Santa Claus will visit us on this occasion and leave a package for every child in the camp, consisting of nuts, oranges, candies, etc. The school children have arranged a program as an entertainment feature of this occasion. On New Year's Eve we will hold a Watch Party and dance the old year out and the new one in. We are arranging to have two picture shows weekly. We also expect to have dances, card parties, lectures and other entertainments as often as the Association may desire them. Arrangements are under way to hold Union Church Services at least every other Sunday afternoon.

The Association, under the direction of the Commissioners, expect to handle all the activities of the Community, committees having been appointed to assist in carrying out the work; a great deal of work has been outlined for the New Year. The Committees are as follows:

Day School	Manual Training
Miss Elizabeth Dungan	Mr. J. Benedict
Mrs. G. E. Warburton	Mr. E. B. Chase
Mr. Clarence Kerr	Mr. C. Lucas
Night School	**Library**
Mr. H. L. Fruend	Mrs. Hutzelman
Mr. Ben Petty	Mrs. Tizzard
Mr. N. L. Hinton	Mr. O. N. Floyd
Mr. H. R. Daubenspeck	

The above committees are under the supervision of the Commissioner of Education, Mr. E. P. Come.

Entertainment	Mr. A. O. Aulabaugh
Mr. B. F. Kincaid	Mrs. Ben Petty
Mrs. Paul Moken	Miss Elizabeth Dungan

The Entertainment Committee will be under the supervision of Mr. W. D. Rogers, Chairman of the Commission.

Fire Prevention	Health and Sanitation
Mr. C. Z. Miller	Mrs. Kerr
Mr. C. Farmer	Mr. E. B. Chase
Mr. D. Holahan	Mr. N. L. Hinton

The above committees will be under the supervision of Commissioner Roy Hutzelman.

Community Service	Religious Activities
Mr. G. E. Warburton	Mr. J. W. Benedict
Mr. O. N. Floyd	Mrs. W. W. Cole
Mr. D. Holahan	Mrs. E. P. Come
Transportation	**Relief**
Mr. R. L. Rogers	Mrs. E. B. Chase
Mr. A. O. Aulabaugh	Mrs. N. L. Hinton
Mr. T. D. Berryman	Mrs. Daniel Holahan
Law and Order	**Individual Gardens**
Mr. J. F. Smith	Mr. B. Larkin
Mr. Ed. Wolverton	Mr. H. W. Tizzard
Mr. Paul Moker	Mr. Otis Winget

The above committees are under the supervision of Commissioner B. H. Petty.

The Organization has 67 Charter Members. Commissioner F. A. Meyer will conduct a campaign to secure additional members.

Residents of the Camp are very much interested in the Night Schools. We now have five classes, including English for foreigners, as follows:

Class	Enrolled	Instructor
Mechanical Drawing	13	H. L. Fruend
Business and Industrial Arithmetic	11	N. L. Hinton
Trigonometry	4	H. R. Daubenspeck
Geometry, Algebra and other Mathematics	4	B. H. Petty

Mr. Lange of the Dayton Y. M. C. A. and Mr. Hinton are arranging for the class in English for foreigners.

The Individual Gardens, Landscape Work and Camp Improvements are receiving attention and plans are being formulated now for next Spring.

The Constitution of the Taylorsville Community Association

Article 1

The name of this organization shall be the TAYLORSVILLE COMMUNITY ASSOCIATION.

Article 2

Its object shall be to promote the Social, Physical, and Intellectual Development of the residents at the Taylorsville Dam Site, of the Miami Conservancy District.

Article 3

Eligibility for Membership

Section 1—All persons of good character, who are employees of the Miami Conservancy District, Project No. 4, and members of their families who are over sixteen (16) years of age, may become members, by making application to the Commissioners here-in-after provided, and being elected to membership in open meeting of the Association, except Charter members, who shall sign the By-Laws and Constitution and be appointed by the Commission within two weeks after November 29, 1918. Elections shall be by secret ballot.

Section 2—All persons elected to membership shall become members upon paying in advance an entrance feet of 50 cents and signing the Constitution and By-Laws.

Section 3—The annual dues shall be $1.00 payable quarterly in advance, beginning January 1, 1919.

Article 4

Section 1—The officers of this Association shall be five Commissioners, who shall be members of this Association in good standing and who shall have been residents at the Taylorsville Dam Site for at least three months, prior to the date of election. They shall serve six months or until their successors are elected and installed.

Section 2—The Commissioner receiving the largest number of votes shall become the Chairman. He shall designate the heads of the following departments from the Commissioners elected:

Community Service,
Social Service,
Education,
Records and Finance,
Community Safety.

Section 3—The Commission shall appoint all Committees, which shall work under the direction of the various Commissioners.

Section 4—The Committees shall carry out all the work under the direction of the Commissioners.

Article 5

Section 1—The Association shall hold at least one meeting each month.

Section 2—The Commission shall meet as often as necessary to transact business of importance promptly.

Gift of Adam Schantz "Lily Water" Plant Site

The right-hand upper picture on the back cover shows what is the largest building in Dayton which must be demolished to provide a wider and better channel for the Miami River through the city of Dayton. It is the Lily Water Plant of the Adam Schantz estate on the north bank of the river just below Dayton View bridge, the end of which appears at the right of the picture. The building is now being torn down. It is of further interest, since the northern half of the property, which is not necessary for the construction of the new levee and channel improvement, has just been bought by the Adam Schantz estate from the District in order to make of it a gift to the city of Dayton in the shape of a public park between River Street and the river. Upon this site stood the original home of the elder Schantz, who erected the buildings later used as a brewery. The act of presentation is a graceful one which will be appreciated by the people of Dayton. It is hoped at some future time to acquire the entire group of buildings seen in the picture along the river bank as far up as the bridge and to make of the property a riverside park. The matter is under consideration by the Dayton View Improvement Association.

On December 3 Lockington entertained forty members of the Piqua Rotary Club at luncheon at the mess hall. Messrs. Paul and Locher attended from the headquarters office. After the luncheon, Mr. Paul outlined the main features of the Lockington work, after which the club adjourned to the damsite to inspect the construction of the outlet works.

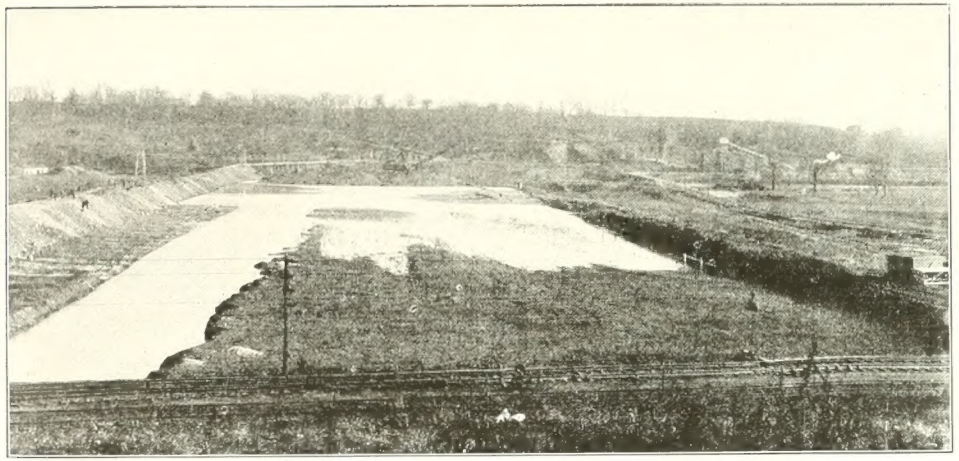


FIG. 84—HYDRAULIC FILL POOL, TAYLORSVILLE, DECEMBER 16, 1918.

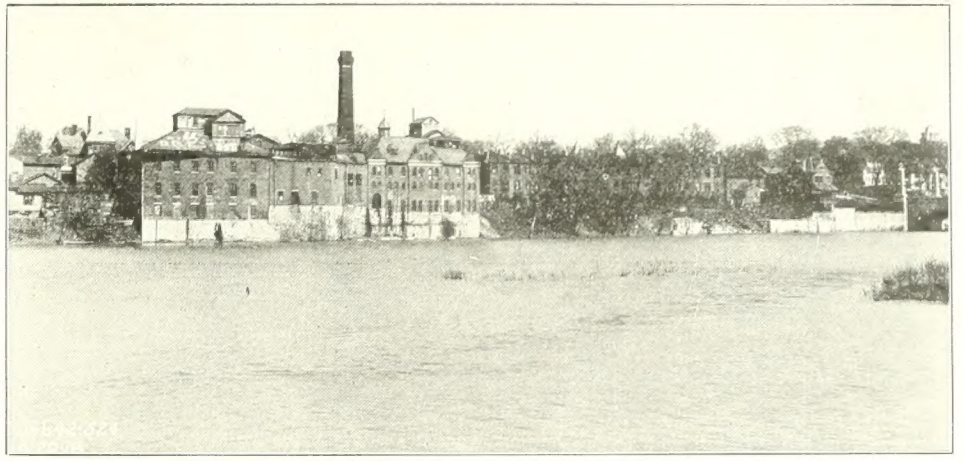


FIG. 85—THE ADAM SCHANTZ "LILY WATER" PLANT, APRIL 20, 1918.

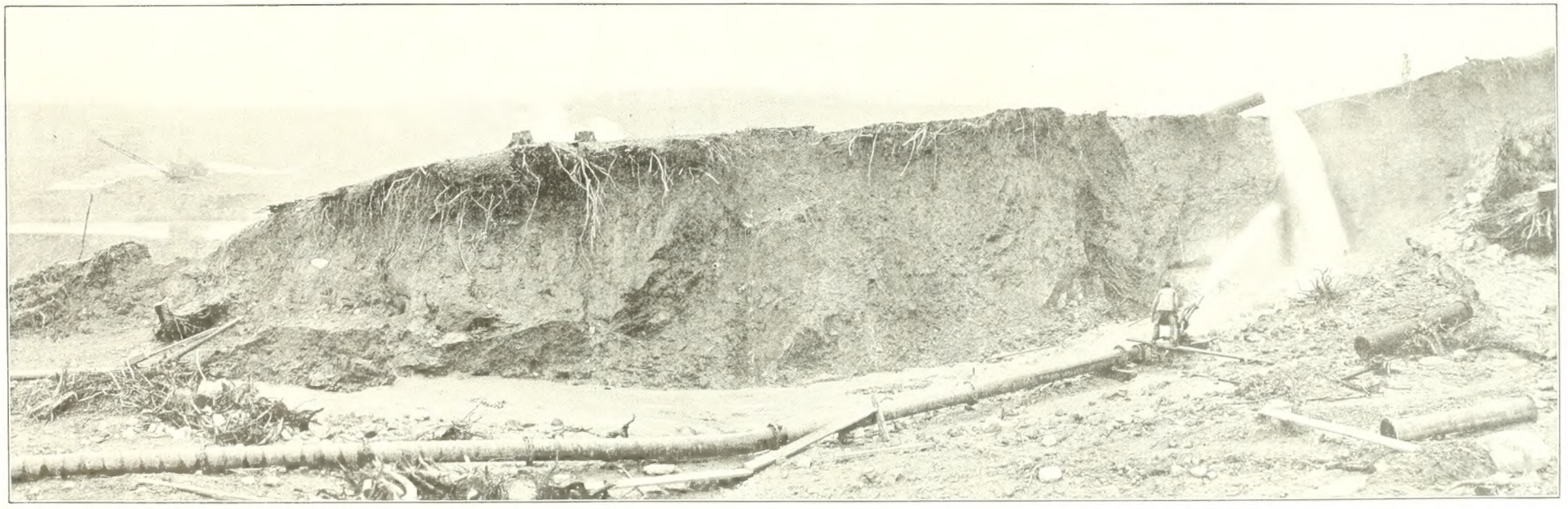


FIG. 86—THE HYDRAULIC FILL BORROW PIT, TAYLORSVILLE, DECEMBER 23, 1918.

On the hillside just east of the Miami River. The pit in the foreground has been already excavated and deposited in the bottom of the pool, which can be seen in the distance across the river at the left. The remaining bank is in process of excavation. A powerful jet of water (2½″ diam., under a pressure of about 115 lbs. per sq. in.) is directed from the "giant" or "monitor" in the foreground against the base of the bank, which is thus undermined and drops off in chunks into the pit beneath the "sluicing water" from the pipe on the top of the bank. The chunks are then knocked to pieces by the jet and washed by the sluicing water down the pit bottom to the "sump," or pump pit (not seen), from which the muddy water (containing also cobble stones up to 5″ diam.) is pumped through a pipe to the pool on the damsite, where the earth is deposited.